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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Estimating the open biomass burning emissions in Central and Eastern China from 2003 to 2015 based on satellite observation" *by* Jian Wu et al.

Anonymous Referee #2

Received and published: 21 May 2018

The manuscript by Wu et al. presents new estimates of emissions from open biomass burning over Central and Eastern China. Its novelty lies in the fact that it blends various sources of information on burnt area (from satellites), biomass availability, emission factors, and socioeconomic aspects to produce emissions estimates that are of high resolution and consistent with recent knowledge. The authors also go some way towards comparing their estimates with previous studies and quantifying the uncertainty of their estimates, though the latter analysis could have been somewhat more thorough and informative (see comment below). The study is within the remit of Atmospheric Chemistry and Physics and I find the results worthy of publication, after some improvements that I describe below.

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GENERAL COMMENTS:

- The uncertainty discussion in Sect. 3.5 can be improved. Presumably for the Monte Carlo simulations, some uncertainty range had to be selected for each individual variable involved in the emissions calculation, but it is not clear what this range is for some variables, such as for example burned area. Also, the authors do not explain what is it that makes specific pollutants (e.g. EC) have larger uncertainty and others smaller? Which of the variables needed for calculating emissions have the biggest role in driving uncertainty? This will help focus future efforts in order to reduce uncertainty in emissions in this area. Finally, when the authors say that "Compared with previous studies, for the emission estimation of forest burning, the uncertainty was improved" or "For cropland, the uncertainty was improved. . .", do they mean that the other studies estimated uncertainty ranges which were wider, or that the datasets used here are better/more suitable?

- The use of English can be polished throughout the manuscript. Not that the language has major problems – more or less it is fine. But almost in every sentence (or every other sentence) I found myself thinking that the choice of words, grammar or syntax could be improved. I have made some suggestions, but there are more places where things can be improved.

SPECIFIC COMMENTS:

Line 19: Please change "few focus" to "little focus".

Line 33: Is "per pixel" informative for the average reader?

Line 35: Please change "for" to "from".

Lines 41-43: I think that these sentences would be better suited for the beginning of the abstract, rather than the end.

Line 84: "accurate" -> "accurately"

Line 114: “the same emissions factors”: The same to what?

Line 119: “historical” might be too strong a word here. Suggest using “of recent years” or something similar.

Line 131: Shouldn’t “E” also be indexed with x and t?

Line 134: Mention explicitly that “CE” stands for combustion efficiency. Also, CE does not have a subscript x in the equation, whereas it does in this line.

Line 147: Is v the same as j in the earlier equation? Then why change the symbol? Same lower down for r and s.

Line 148: Not clear (to me at least) what “outside of the burned area” means here. I think generally Equation 2 would benefit from a somewhat clearer explanation for the readers not familiar with the technical details of the products.

Lines 154-158: So, is the biomass basically a step function? Is this justifiable? Is this expected to generate any artifacts in the results?

Lines 188-189: What does “similar” mean here?

Line 190: Is there a reference for this previous research?

Line 193: “opening” -> “open”

Line 202: Maybe the title should be “Other factors influencing OBB emission”?

Line 209: “20, 000” -> “20,000”

Lines 214-215: It should be made clear somewhere that PM2.5 and OC/EC are not totally different things, i.e. PM will include some OC and EC.

Line 217: Suggest removing “section”.

Line 240: “This is mostly”: Which? For example, what are the “suitable weather conditions” in this case?

Figure 6: “opening” -> “open”

Lines 255-259: There is a confusion between trends and short-term (interannual) variations here. Can the authors perhaps provide the overall trend for each species for the whole period, and whether it is statistically significant?

Line 265: Presumably it is just coincidental that they are odd and even years. Therefore maybe not worth the emphasis?

Line 280: Increased or decreased?

Line 288: “scattering” -> “scattered”

Line 315: “totally occupied. . .”: Please improve phrasing.

Line 318: “based on the correlation of emissions in each month” -> “based on the correlation between their monthly emissions”

Line 328: “occurred” -> “occurring”

Line 345: “were found” -> “featured”

Lines 348-349: “are uniformed” -> “remain similar”

Line 378: May need to improve terminology a bit. For example, why is “local burning habits” not part of “anthropogenic activities”? What is the distinction?

Line 380: “People sweep their graves”: The authors may want to change the wording as “their” might be a bit misleading here...

Line 382: “file” -> “fire”

Line 406: “where” -> “which”

Line 416: “have” -> “having”

Line 420: Maybe “close” is a bit of an overstatement? They should not be expected to be very close anyway as there seem to have been several improvements in the current

study.

Line 421-422: “The differences were mainly caused. . .”: How do the authors know that these are the causes of differences? And which of the factors may be more responsible?

Line 431: Are lower EFs used here more justifiable?

Lines 436-439: This can be combined into one sentence to avoid repetition.

Line 438: “localized in CEC” -> “specific to CEC”

Line 439: “can improve” -> “are likely to have improved”

Line 446: Do 0.03 and 0.85 refer to relative uncertainties?

Line 446: “At last” -> “Finally”

Line 474: “opening” -> “open”

Line 487: “of the next year” is not needed.

Line 488: “impacted on the emission”: This implies causality but the analysis has been based on correlations, which can only be suggestive of possible associations but not conclusive for cause-effect relationships.

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